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1890-91). Their description of the rock-beds shows a good deal of resemblance to those of Newark. Fletcher, in his last report, gives several detailed sections of Permian rocks up to five thousand and eight thousand feet in thickness. It seems hardly probable that no traces of so vast a formation should be found in the eastern United States near either the Mesozoic or Paleozoic rocks with which it is so intimately associated in Nova Scotia and Prince Edward Island.

It would seem, then, that the Mesozoic age of the beds of Newark is not so thoroughly certain but that it might be worth while for paleontologists to reëxamine with renewed care the indications of the fossils that really bear on the point. For undoubtedly the very scanty and imperfect testimony of the fossils already known; the apparent bias, on the one hand, in favor of comparing them only with Mesozoic forms that are extremely remote at best; on the other hand, the less biased partial identification of some Newark fossils with Paleozoic ones under conditions at least equally favorable as regards skill and material; the great thickness of measures below the comparatively well-identified Rhætic or Triassic horizon of the Gwynedd and Phoenixville shales, the same probably as the Richmond and North Carolina coal-bearing beds; and the possibility, to say the least, that some of the red beds conformably at the top of the Carboniferous rocks of southwestern Pennsylvania and of West Virginia, as well as some of the Permian or Carboniferous beds of eastern Canada, may be of identical age with the Newark beds; all these circumstances make it seem not altogether improbable that the Newark brownstone is older than the Mesozoic.

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*Further on the Age of the Newark Brownstone.*

*By Benjamin Smith Lyman.*

*(Read before the American Philosophical Society, January 19, 1894.)*

An additional reason for doubting the Mesozoic age of the Newark brownstone may be found in the remarks of Newberry on his fossil plant *Dendrophycus triassicus*, found at Portland, Conn., in sandstone of possibly the same age as the Newark brownstone. He quotes (Monograph xiv, p. 82) Lesquereux's description of *Dendrophycus Desori*, found in the Pennsylvania No. XI, or Umbral shales; and adds: "I have copied this description nearly entire because it is almost literally applicable to a plant represented on Pl. xxi of this memoir and obtained from the sandstones of Portland, Conn. When we consider the vast interval of time between the deposition of the Umbral shale of Pennsylvania and that of the Rhætic sandstone of Connecticut, one the base of the Carboniferous sys-

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tem and the other the summit of the Trias, it cannot fail to be regarded as interesting and surprising that the resemblance should be so complete. But for the *a priori* improbability that a species of seaweed should be so long-lived I should hardly feel justified in giving even a new specific name to the Triassic specimens. Possibly a comparison of more material would show differences not now perceptible, but the peculiar mode of growth and the details of structure seem to be essentially the same. In the Portland sandstones, as in the Umbral shales, the fronds of *Dendrophycus* are enrolled in masses that suggest cabbage heads of large size and rather loose texture, while the mode of subdivision and the character of the final ramifications of the fronds are so like that, with the similarity of the enclosing rock, the specimens from the two localities and horizons are almost undistinguishable."

It seems clear that the Portland *Dendrophycus*, if viewed without prejudice, would, like the Belleville and Newark *Lepidodendron*, strongly indicate the Palaeozoic age of the brownstone.

It is not yet certain, however, whether the Portland sandstone and the Newark brownstone are of the same age; for the Portland beds are near the eastern edge of the so called Mesozoic rocks of Connecticut that have generally easterly dips, so that the beds have sometimes been taken to be near the top of the column, while the Newark beds are no doubt towards the bottom of the so-called Mesozoic of New Jersey. Still the geological structure in Connecticut has not been so thoroughly worked out as to make that position of the Portland beds perfectly sure. Percival's map would seem rather to indicate that they are on the eastern side of a basin; and Dana (*Am. Jour. Sci.*, 1891, Vol. xlii, p. 446) says the sandstone at Portland is nearly horizontal, and occasionally the dip is westerly. It seems, then, not impossible that some of the lower, more ancient beds have here come to the surface. It is not yet known, either, how great may be the total thickness of the Connecticut Mesozoic, so-called; nor to what parts of the New Jersey and Pennsylvania rocks it may correspond. But the lithological character, as well as the decidedly Paleozoic look of the only determined fossil of the Portland beds, go somewhat strongly to show an identity in age with the Newark brownstone.

At any rate the paleontological argument for the Mesozoic age of all parts of the so-called New Red is plainly not so perfect as it has often been supposed to be.